

# Search Report

EIC 2800

## STIC Database Tracking Note

To: FORREST PHILLIPS  
Location: JEF-10A64  
Art Unit: 2837  
Wednesday, June 18, 2008  
  
Case Serial Number: 10/560777

From: RAJ PATEL  
Location: EIC2800  
JEF-4B68 / JEF-4A58  
Phone: (571)272-6231  
  
[raj.patel@uspto.gov](mailto:raj.patel@uspto.gov)

## Search Notes

RE: Diaphragm of a speaker made of Foam and reinforced or wound by wires.

Attached are the search histories and edited search results from the following databases:

DIALOG -- European and WIPO/PCT patents Full Text

DIALOG -- Multiple Databases

EAST -- USPat, USPGPUB, DERWENT, EPO, JPO and IBM\_TDB

The attached documents may include articles showing speaker Diaphragms made of foam and embedded with reinforcing members such as fibers, wires, yarns etc.

I recommend that you review all the attached results.

If you like more searching on this case or have questions or comments, please feel free to let me know.

Best Regards,  
Raj.

Suggs, Faye (ASRC)

24312

From: FORREST PHILLIPS [forrest.phillips@uspto.gov]  
Sent: Tuesday, June 10, 2008 5:48 PM  
To: STIC-EIC2800  
Cc: NPL Feedback  
Subject: Database Search Request, Serial Number: 10560777

JUN 11 2008

Requester: FORREST PHILLIPS (P/2837)

Art Unit: P/2837

Employee Number: 82254

Office Location: JEF 10A64

Phone Number: (571)272-9020

Mailbox Number:

Case serial number: 10560777

Class / Subclass(es): 181/174

Earliest Priority Filing Date: 6/07/04

Format preferred for results: E-mail

Attachment: No.

Search Topic Information:

a diaphragm for a speaker, made of foam and having wires or thelike wound about the foam block to strength it in one direction, that of the axial movement. I have found foam diaphragms but nothing teaching the use of windings to strengthen the ofam in one direction. Transducers, be it microphone or speaker would be best but other instances of the foam being strengthened like that are also good. Thanks

Special Instructions and Other Comments:



## VOLUNTARY SEARCH FEEDBACK

Art Unit \_\_\_\_\_

App./Serial # \_\_\_\_\_

### **Relevant prior art found**

- 102 rejection
- 103 rejection
- Cited as being of interest
- Helped better understand invention
- Helped better understand state of the art in technology

Types  Foreign Patent(s)  Non-Patent Literature

### **Relevant prior art not found**

- Results verified the lack of relevant prior art (helped determine patentability).
- Results were not useful in determining the patentability or understanding of the invention.

### **COMMENTS** (click below to type)

Questions about the scope or the results of the search?

Contact your EIC searcher or EIC Supervisor.

Please submit completed form to your EIC

12/07

### **STIC USE ONLY**

Today's Date \_\_\_\_\_

Additional Notes if applicable (please indicate all actions including emails, phone calls, and individuals assisting):  
\_\_\_\_\_  
\_\_\_\_\_

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? b 348,349

[File 348] EUROPEAN PATENTS 1978-2007/ 200824

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[File 349] PCT FULLTEXT 1979-2008/UB=20080605 UT=20080529

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Holding session beginning: 6/17/2008 1:26:09 PM

- | Set | Items | Description  |
|-----|-------|--|
| S1  | 25360 | S (DIAPHRAGM?? OR MEMBRANE?? OR LAMINA???? OR COVER???? OR RESONAT???? OR DISK????? OR PARTITION?????)(5N)(FOAM??? OR POLYSTYRENE OR CARDBOARD?? OR CARD(BOARD?? OR SPONG????? OR ((POROUS OR NONPOROUS OR MICROPOROUS)(2N)(MATERIAL?? OR SHEET?? OR BOARD????)))  |
| S2  | 22262 | S (WIRE??? OR WIRING?? OR TAPE?? OR FIBER?? OR FIBRE?? OR COIL??? OR CORD?? OR CABLE?? OR STRAND?? OR FILAMENT??)(5N)(WOUND??? OR WINDING?? OR WIND?? OR WRAP???? OR ROLL???? OR BOUND????)(5N)(STRENGTH????? OR REINFORC????? OR RE(JNFORC????? OR REENFORC????? OR RE(JENFORC????? OR STIFFEN????? OR GUARD????? OR SAFEGUARD????? OR PROTECT????? OR SHIELD????? OR SUPPORT????? OR FORTIF????? OR STABILI?????)) |
| S3  | 865   | S IC=(H04R-7? OR H04R-07? OR H04R-007? OR H04R0007?)   |
| S4  | 0     | S S3(5N)(FOAM??? OR POLYSTYRENE OR CARDBOARD?? OR CARD(BOARD?? OR SPONG????? OR ((POROUS OR NONPOROUS OR MICROPOROUS)(2N)(MATERIAL?? OR SHEET?? OR BOARD????)))  |
| S5  | 1364  | S S1 AND S2  |
| S6  | 153   | S S5 AND (SPEAKER?? OR LOUDSPEAKER?? OR MICROPHONE?? OR MICRO(PHONE?? OR TRANSDUCER?? OR WOOFER?? OR SUBWOOFER?? OR ACOUST????? OR SOUND????))   |
| S7  | 117   | S S6 AND PY<=2004  |
| S8  | 8     | S S7 AND (SPEAKER?? OR LOUDSPEAKER?? OR MICROPHONE??)/TI   |
| S9  | 1     | S S7 AND (DIAPHRAGM??)/TI  |

[File 610] **Business Wire** 1999-2008/Jun 17

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\*File 610: File 610 now contains data from 3/99 forward. Archive data (1986-2/99) is available in File 810.

[File 613] **PR Newswire** 1999-2008/Jun 17

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\*File 613: File 613 now contains data from 5/99 forward. Archive data (1987-4/99) is available in File 813.

[File 621] **Gale Group New Prod.Annou.(R)** 1985-2008/May 29

(c) 2008 The Gale Group. All rights reserved.

[File 649] **Gale Group Newswire ASAP(TM)** 2008/May 29

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[File 810] **Business Wire** 1986-1999/Feb 28

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[File 813] **PR Newswire** 1987-1999/Apr 30

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[File 9] **Business & Industry(R)** Jul/1994-2008/Jun 09

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[File 16] **Gale Group PROMT(R)** 1990-2008/Jun 10

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\*File 16: Because of updating irregularities, the banner and the update (UD=) may vary.

[File 47] **Gale Group Magazine DB(TM)** 1959-2008/Jun 04

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[File 80] **TGG Aerospace/Def.Mkts(R)** 1982-2008/Jun 10

(c) 2008 The Gale Group. All rights reserved.

[File 93] **TableBase(R)** Sep 1997-2008/Jun W2

(c) 2008 The Gale Group. All rights reserved.

[File 111] **TGG Natl.Newspaper Index(SM)** 1979-2008/May 27

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[File 112] **UBM Industry News** 1998-2004/Jan 27

(c) 2004 United Business Media. All rights reserved.

[File 116] **Brands & Their Companies** 2007/Aug

(c) 2007 Gale Research Inc. All rights reserved.

[File 141] **Readers Guide** 1983-2008/Apr

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[File 148] **Gale Group Trade & Industry DB** 1976-2008/May 28

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\*File 148: The CURRENT feature is not working in File 148. See HELP NEWSI48.

[File 149] **TGG Health&Wellness DB(SM)** 1976-2008/Jun W1

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[File 160] **Gale Group PROMT(R)** 1972-1989

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[File 177] **Adv.& Agency Red Books:Advertisers** 2008/May

Case # 10/560,777

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[File 178] **Adv.& Agency Red Books:Agencies** 2008/May

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[File 188] **Health Devices Sourcebook** 2007

ECRI (A nonprofit agency). All rights reserved.

[File 198] **Health Devices Alerts(R)** 1977-2007/May W3

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[File 211] **Gale Group Newsearch(TM)** 2008/May 28

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[File 256] **TecInfoSource** 82-2008/Jun

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[File 275] **Gale Group Computer DB(TM)** 1983-2008/Jun 10

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[File 482] **Newsweek** 2000-2008/Jun 09

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[File 484] **Periodical Abs Plustext** 1986-2008/May W4

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[File 535] **Thomas Register Online(R)** -2008/Q1

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[File 571] **Piers Exports(US Ports)** 2008/Jun W3

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[File 573] **Piers Imports(US Ports)** 2008/Jun W2

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[File 583] **Gale Group Globalbase(TM)** 1986-2002/Dec 13

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[File 584] **KOMPASS USA** 2007/JUL

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\*File 609: This file is closed.

[File 636] Gale Group Newsletter DB(TM) 1987-2008/Jun 11

(c) 2008 The Gale Group. All rights reserved.

[File 646] Consumer Reports 1982-2008/Apr

(c) 2008 Consumer Union. All rights reserved.

[File 647] CMP Computer Fulltext 1988-2008/Jun W1

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b prodann,prodinfo

Set	Items	Description
S1	14607	S (DIAPHRAGM?? OR MEMBRANE?? OR LAMINA????? OR COVER????? OR RESONAT????? OR DISK????? OR PARTITION?????)(SN)(FOAM??? OR POLYSTYRENE OR CARDBOARD?? OR CARD(BOARD?? OR SPONG????? OR ((POROUS OR NONPOROUS OR MICROPOROUS)(2N)(MATERIAL?? OR SHEET?? OR BOARD??)))
S2	8671	S (WIRE??? OR WIRING?? OR TAPE?? OR FIBER?? OR FIBRE?? OR COIL????? OR CORD?? OR CABLE?? OR STRAND?? OR FILAMENT???(SN)(WOUND??? OR WINDING?? OR WIND?? OR WRAP????? OR ROLL??? OR BOUND?????)(SN)(STRENGTH????? OR REINFORC????? OR REINFORC????? OR REENFORC????? OR RE(ENFORC????? OR STIFFEN????? OR GUARD????? OR SAFEGUARD????? OR PROTECT????? OR SHIELD????? OR SUPPORT????? OR FORTIF????? OR STABILI?????)
S3	42	S S1 AND S2 AND (SPEAKER?? OR LOUDSPEAKER?? OR MICROPHONE?? OR MICRO(PHONE?? OR TRANSDUCER?? OR WOOFER?? OR SUBWOOFER?? OR ACOUST????? OR SOUND????)
S4	26	S S3 AND PY<=2004

## EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S3	1	"20060137935"	US-PGPUB	OR	ON	2008/06/13 10:13
S4	2	"20060137935"	US-PGPUB ; DERWENT	OR	ON	2008/06/12 13:04
S5	1	".3841197".pn.	US-PGPUB ; USPAT	OR	ON	2008/06/16 12:41
S6	2	("4410768" "6097829").pn.	US-PGPUB ; USPAT	OR	ON	2008/06/13 10:21
S7	2	diaphragm\$2 with (speaker\$2 or loudspeaker\$2 or microphone\$2 or transducer\$2) with foam\$2 with (strength\$5 or reinforc\$5 or re\$linforc\$5) with (wire\$2 or wound\$3 or wind\$4 or yarn\$2 or ribbon\$2 or tape\$2)	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/13 15:20
S8	1	("2934612").URPN.	USPAT	OR	OFF	2008/06/13 10:32
S9	34	diaphragm\$2 with (speaker\$2 or loudspeaker\$2 or microphone\$2 or transducer\$2) with foam\$2 with (strength\$5 or reinforc\$5 or re\$linforc\$5)	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/13 10:38
S10	24	diaphragm\$2 with (speaker\$2 or loudspeaker\$2 or microphone\$2 or transducer\$2) with foam\$2 with (wire\$2 or wound\$3 or wind\$4 or yarn\$2 or ribbon\$2 or tape\$2)	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 12:11
S11	59	diaphragm\$2 with (speaker\$2 or loudspeaker\$2 or microphone\$2 or transducer\$2) with (strength\$5 or reinforc\$5 or re\$linforc\$5) with (wire\$2 or wound\$3 or wind\$4 or yarn\$2 or ribbon\$2 or tape\$2)	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/13 15:20

## EAST Search History

S12	57	S11 not S10	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 11:25
S13	2	"57025793"	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 10:54
S14	1	"20020146145"	US-PGPUB	OR	ON	2008/06/16 11:27
S15	1	"0078091"	EPO; DERWENT	OR	ON	2008/06/16 11:27
S16	1	2001-475540.NRAN.	DERWENT	OR	OFF	2008/06/16 11:34
S17	22	{stuart near2 nevill}.in.	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/06/16 11:39
S18	72	((B near2 W) near2 (loudspeaker\$2 or group\$2)).as.	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/06/16 11:40
S19	57	S18 not S17	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/06/16 11:40
S20	2	"2003174694"	US-PGPUB ; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 12:11

## EAST Search History

S21	2	{speaker\$2 or loudspeaker\$2 or loud adj speaker\$2 or microphone\$2 or micro adj phone\$2 or transducer\$2) with (Diaphragm\$2 or membrane\$2 or lamina\$5 or cover\$4) with (foam\$3 or polystyrene) with (winding\$2 or wound\$3 or bound\$4 or tensile or mono\$1filament) with (strength\$5 or reinforc\$4 or re adj inforc\$4 or reenforc\$4 or re adj enforce\$4 or stiffen\$4 or safeguard\$4 or protect\$4 or shield\$4 or support\$4 or fortif\$4 or stabili\$5)	EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 12:47
S22	9	{speaker\$2 or loudspeaker\$2 or loud adj speaker\$2 or microphone\$2 or micro adj phone\$2 or transducer\$2) with (Diaphragm\$2 or membrane\$2 or lamina\$5 or cover\$4) with (foam\$3 or polystyrene) with (winding\$2 or wound\$3 or bound\$4 or tensile or mono\$1filament) with (strength\$5 or reinforc\$4 or re adj inforc\$4 or reenforc\$4 or re adj enforce\$4 or stiffen\$4 or safeguard\$4 or protect\$4 or shield\$4 or support\$4 or fortif\$4 or stabili\$5)	US-PGPUB ; USPAT	OR	ON	2008/06/16 12:50

## EAST Search History

S23	48	(speaker\$2 or loudspeaker\$2 or loud adj speaker\$2 or microphone\$2 or micro adj phone\$2 or transducer\$2) with (Diaphragm\$2 or membrane\$2 or lamina\$5 or cover\$4) with (foam\$3 or polystyrene) with (wire\$3 or wiring\$2 or wound\$4 or winding\$2 or tape\$2 or ribbon\$2 or yarn\$2 or fiber\$2 or fibre\$2 or resin\$2 or warp\$2 or coils\$4 or cable\$2 or monofilament\$2 or mono adj filament\$2 or line\$2 or cord\$2 or tow or elongate\$4 or strand\$2 or filament\$2 or flexible or tensile or bound\$4) with (strength\$5 or reinforc\$4 or re adj inforc\$4 or reenforc\$4 or re stiffen\$4 or safeguard\$4 or protects\$4 or shield\$4 or support\$4 or fortif\$4 or stabili\$5)	US-PGPUB ; USPAT	OR	ON	2008/06/16 13:36
S24	39	S23 not S22	US-PGPUB ; USPAT	OR	ON	2008/06/16 12:52
S25	34	(speaker\$2 or loudspeaker\$2 or loud adj speaker\$2 or microphone\$2 or micro adj phone\$2 or transducer\$2) with (Diaphragm\$2 or membrane\$2 or lamina\$5 or cover\$4) with (foam\$3 or polystyrene) with (wire\$3 or wiring\$2 or wound\$4 or winding\$2 or tape\$2 or ribbon\$2 or yarn\$2 or fiber\$2 or fibre\$2 or resin\$2 or warp\$2 or coils\$4 or cable\$2 or monofilament\$2 or mono adj filament\$2 or line\$2 or cord\$2 or tow or elongate\$4 or strand\$2 or filament\$2 or flexible or tensile or bound\$4) with (strength\$5 or reinforc\$4 or re adj inforc\$4 or reenforc\$4 or re stiffen\$4 or safeguard\$4 or protect\$4 or shield\$4 or support\$4 or fortif\$4 or stabili\$5)	EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 13:04

## EAST Search History

S26	10	(speaker\$2 or loudspeaker\$2 or loud adj speaker\$2 or microphone\$2 or micro adj phone\$2 or transducer\$2) with (Diaphragm\$2 or membrane\$2 or lamina\$5 or cover\$4) with (foam\$3 or polystyrene) with (wire\$3 or wiring\$2 or tape\$2 or ribbon\$2 or yarn\$2 or fiber\$2 or fibre\$2 or resin\$2 or warp\$2 or coil\$4 or cable\$2 or monofilament\$2 or mono adj filament\$2 or line\$2 or cord\$2 or tow or elongate\$4 or strand\$2 or filament\$2 or flexible or tensile or bound\$4) with (strength\$5 or reinforc\$4 or re adj inforc\$4 or reenforc\$4 or re adj enforce\$4 or stiffen\$4 or safeguard\$4 or protect\$4 or shield\$4 or support\$4 or fortify\$4 or stabili\$5) with (wound\$4 or winding\$2 or wind or wrap\$4 or roll\$4)	US-PGPUB ; USPAT	OR	ON	2008/06/16 13:38
S27	3	(speaker\$2 or loudspeaker\$2 or loud adj speaker\$2 or microphone\$2 or micro adj phone\$2 or transducer\$2) with (Diaphragm\$2 or membrane\$2 or lamina\$5 or cover\$4) with (foam\$3 or polystyrene) with (wire\$3 or wiring\$2 or tape\$2 or ribbon\$2 or yarn\$2 or fiber\$2 or fibre\$2 or resin\$2 or warp\$2 or coil\$4 or cable\$2 or monofilament\$2 or mono adj filament\$2 or line\$2 or cord\$2 or tow or elongate\$4 or strands\$2 or filament\$2 or flexible or tensile or bound\$4) with (strength\$5 or reinforc\$4 or re adj inforc\$4 or reenforc\$4 or re adj enforce\$4 or stiffen\$4 or safeguard\$4 or protect\$4 or shield\$4 or support\$4 or fortify\$4 or stabili\$5) with (wound\$4 or winding\$2 or wind or wrap\$4 or roll\$4)	EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 13:49

CASE # 10/560,777

## EAST Search History

S28	0	winding\$2 with strength\$4 with foam with diaphragm\$2	EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 13:50
S29	0	winding\$2 with strength\$6 with foam with diaphragm\$2	EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 13:50
S30	1	winding\$2 with foam with diaphragm\$2	EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 13:50
S31	0	diaphragm\$2 with winding\$2 with strength\$6 with foam\$3	EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 13:52
S32	1	"0078091"	EPO; JPO; DERWENT; IBM_TDB	OR	ON	2008/06/16 13:52

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## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
21 December 2000 (21.12.2000)

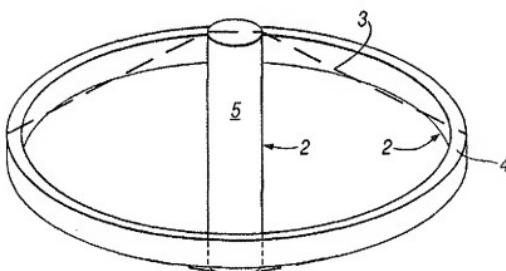
PCT

(10) International Publication Number  
WO 00/78091 A2

- (51) International Patent Classification<sup>7</sup>: H04R 1/00      (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EB, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (21) International Application Number: PCT/GB00/02289
- (22) International Filing Date: 13 June 2000 (13.06.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
9913835.6      14 June 1999 (14.06.1999) GB
- (71) Applicant (*for all designated States except US*): B & W LOUDSPEAKERS LIMITED (GB/GB); Meadow Road, Worthing BN11 2RX (GB).
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): NEVILLE, Stuart, Michael (GB/GB); 252 Belgrave Road, Welling, Kent DA16 3RT (GB).
- (74) Agents: NETTLETON, John, Victor et al.; Abel & Imray, 20 Red Lion Street, London WC1R 4PQ (GB).
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:**  
— Without international search report and to be republished upon receipt of that report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

## (54) Title: STIFFENED MEMBRANE ASSEMBLIES



WO 00/78091 A2

- (57) Abstract: A stiffened membrane assembly for use as the diaphragm of a loudspeaker drive unit or as a wall of a loudspeaker enclosure comprises a frame (2) and a multiplicity of tensile members (3) spanning the frame (2) and acting in tension on it, the frame and tensile members having a membrane attached thereto.

PAGE 1 OF 2

4/4

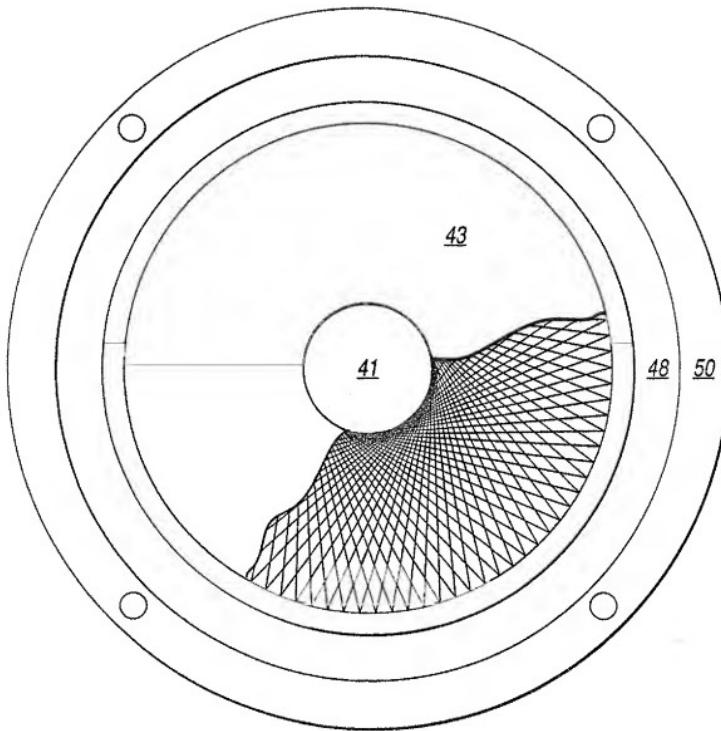


Fig.6

PAGE 2 OF 2

CASE # 10/560,777

PAT-NO: JP02003174694A  
DOCUMENT- JP 2003174694 A  
IDENTIFIER:  
TITLE: DIAPHRAGM FOR SPEAKER, SPEAKER, AND DIAPHRAGM FOR PANEL  
MICROPHONE

PUBN-DATE: June 20, 2003 ←

INVENTOR-INFORMATION:

NAME	COUNTRY
ONO, HIDEO	N/A
SHICHIMA, KIYOTAKA	N/A
NAITO, MASATO	N/A

JP 2003174694

ASSIGNEE-INFORMATION:

NAME	COUNTRY
JSP CORP	N/A

APPL-NO: JP2001372777

APPL-DATE: December 6, 2001

INT-CL (IPC): H04R007/02 , H04R007/04

ABSTRACT:

PROBLEM TO BE SOLVED: To provide a diaphragm used for a speaker and having superior lightweight and elastic modulus in tension as well as good energy internal loss, a diaphragm used for a flat speaker and having low sound distortion, superior omnidirection, and flat frequency response even in a wide reproducing band, the speakers using the diaphragms, and a diaphragm for a panel microphone.

SOLUTION: The diaphragm used for the speaker is formed by laminating a reinforced fiber-containing fiber-reinforced thermoplastic resin sheet continuously arranged in the unidirection or in the orthogonally intersected bidirection on a base material selected from a thermoplastic resin foam, a cardboard, or a corrugated board and having a thickness of 0.5 to 50 mm and a weight per unit area of 50 to 2,000 g/m

COPYRIGHT: (C)2003,JPO

CASE # 10/560,777

US-PAT-NO: 5033093  
DOCUMENT-IDENTIFIER: US 5033093 A  
TITLE: Compact microphone and method of manufacture  
DATE-ISSUED: July 16, 1991

US-CL-CURRENT: 301/177, 181/157, 181/167, 381/163, 381/361

APPL-NO: 07/466599  
DATE FILED: January 17, 1990

Claims Text - CLTX (1):

1. A method of making a dynamic microphone which comprises the steps of forming a diaphragm body of thin synthetic resinous sheet material of high tensile and flexural strength, forming a multi-layer central portion of thin synthetic resinous material and thin wire metal mesh, contacting the central portion centrally of the diaphragm body and integrating while deforming both so that they are domed with the diaphragm body on the concave side of the central portion.

Claims Text - CLTX (5):

5. A method of making a dynamic microphone which comprises the steps of forming a permanent magnet having opposite faces and a high ratio of diameter-to-height, forming a diaphragm body of thin synthetic resinous sheet material of high tensile and flexural strength, forming a multi-layer central portion of thin synthetic resinous material and thin wire metal mesh, contacting the central portion centrally of the diaphragm body and integrating while deforming both so that they are domed with the diaphragm body on the concave side of the central portion, the central portion being less than one-half the total area of the diaphragm body, forming a voice coil having a diameter and a diameter-to-height ratio greater than those of the magnet, affixing the voice coil in circumscribing relation to the domed area and on the convex side thereof, locating the voice coil to surround the magnet, and fixing the periphery of the diaphragm relative to the magnet.

Claims Text - CLTX (12):

12. A compact microphone construction comprising the combination of a diaphragm having a multi-layer laminated, low mass rigid domed central portion including first and second deformable layers and wire mesh layer adhesively bonded therebetween and a surrounding single layer attachment portion integral with and extending from said second layer, said second layer having high tensile and flexural strength whereby the diaphragm is free to vibrate in a plane normal to the diaphragm, an annular voice coil attached to and circumscribing the domed central portion on the concave side thereof, and a compact magnet assembly including a permeable cup portion having a circular recess with a closed inner wall, an upstanding annular wall portion extending from the inner wall and forming a pole piece, a thin disk shaped fixed permanent magnet disposed within the recess in abutment with the closed wall, and a disk like permeable pole piece disposed over

CASE # 10/560,777

PGPUB-DOCUMENT-NUMBER: 20040131221

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20040131221 A1

TITLE: Speaker surround and method for producing the same

PUBLICATION-DATE: July 8, 2004

US-CL-CURRENT: 381/398, 381/424

APPL-NO: 10/676109

DATE FILED: October 2, 2003

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	DOC-ID	APPL-DATE
JP	P2002-289647	2002JP-P2002-289647	October 2, 2002

Detail Description Paragraph - DETX (3):

[0022] A speaker surround according to the invention is the one which is installed between a speaker cone paper (diaphragm) and a frame of a speaker, a reinforcing member being equipped inside urethane foam, and the reinforcing member is with no expansion and contraction upon deformation based on displacement of the speaker cone paper.

Claims Text - CLTX (2):

1. A speaker surround arranged between a diaphragm and a frame of a speaker, the speaker surround comprising: a reinforcing member installed inside urethane foam, the reinforcing member being the one with no expansion and contraction upon deformation based on the displacement of the diaphragm.

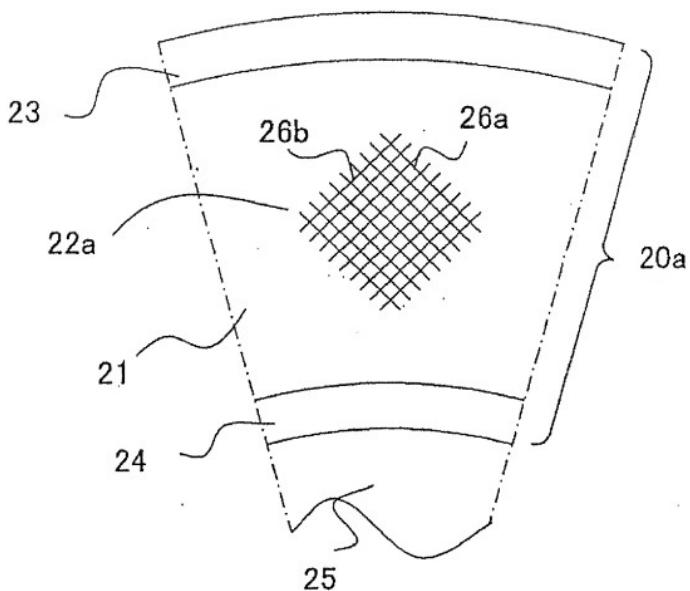
SHEET 1 OF 3

CASE # 10/560,777

Patent Application Publication Jul. 8, 2004 Sheet 2 of 5

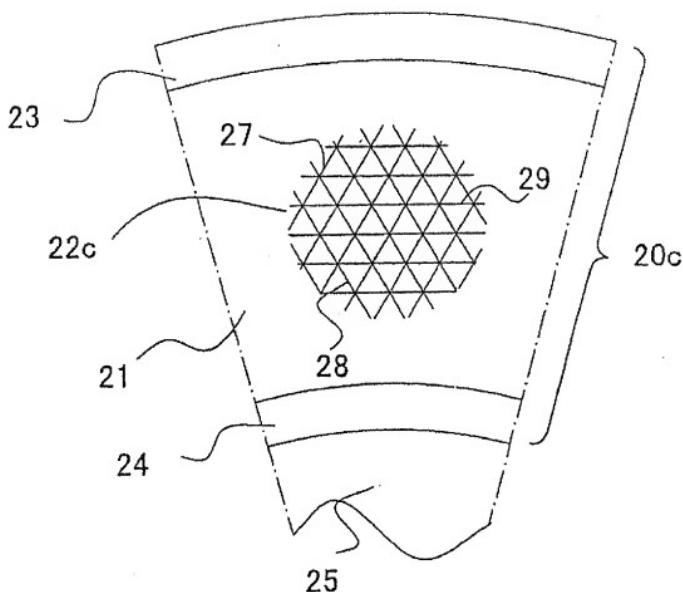
US 2004/0131221 A1

FIG. 3



SHEET 2 OF 2

FIG. 5



SHEET 3 OF 3

CASE # 101560,777

DERWENT- 1989-336707

ACC-NO:

DERWENT- 198946

WEEK:

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TITLE: Loudspeaker diaphragm consists of fibre -reinforced plastic in which resin is reinforced by three sets of crossed fibre yarns NoAbstract Dwg 2,3/3

PRIORITY-DATA: 1988JP-093972 (April 15, 1988)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
JP 01251898 A	October 6, 1989 JA	←

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP 01251898A	N/A	1988JP-093972	April 15, 1988

INT-CL-

CURRENT:

TYPE	IPC DATE
CIPP	H04 R 7/02 20060101

Derwent Accession Number - NRAN (1):

1989-336707

Title - TIX (1):

Loudspeaker diaphragm consists of fibre -reinforced plastic in which resin is reinforced by three sets of crossed fibre yarns NoAbstract Dwg 2,3/3

Standard Title Terms - TTX (1):

LOUDSPEAKER DIAPHRAGM CONSIST FIBRE REINFORCED PLASTIC RESIN THREE SET CROSS  
YARN NOABSTRACT

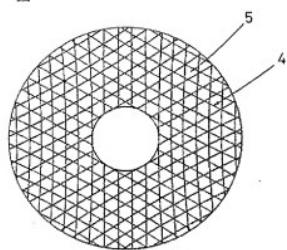
JP 01251898

SHEET 1 OF 2

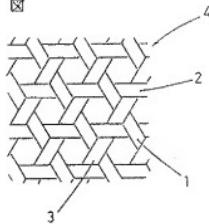
CASE# 101560,777

JR  
特開平1-251898 (4)

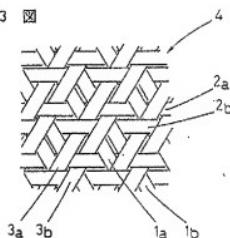
第 1 図



第 2 図



第 3 図



SHEET 2 OF 2

CASE # 10/560,777

DERWENT- 1984-308975

ACC-NO:

DERWENT- 198450

WEEK:

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TITLE: Diaphragm for speaker has plastics foam core, adhering surface plates and reinforcing members across core NoAbstract Dwg 1,2/2

PRIORITY-DATA: 1984JP-064068 (April 15, 1983)

PATENT-FAMILY:

PUB-NO            PUB-DATE            LANGUAGE  
JP 59191998 A October 31, 1984 JA 

APPLICATION-DATA:

PUB-NO            APPL-DESCRIPTOR APPL-NO            APPL-DATE  
JP 59191998A N/A            1984JP-064068 April 15, 1983

INT-CL-  
CURRENT:

TYPE	IPC DATE
CIPP	<u>B32</u> B 5/18 20060101
CIPS	<u>H04</u> R 7/02 20060101
CIPS	<u>H04</u> R 7/10 20060101

Derwent Accession Number - NRAN (1):

1984-308975

Title - TIX (1):

Diaphragm for speaker has plastics foam core, adhering surface plates and reinforcing members across core NoAbstract Dwg 1,2/2

Standard Title Terms - TTX (1):

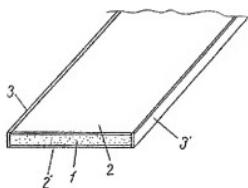
DIAPHRAGM SPEAKER PLASTICS FOAM CORE ADHERE SURFACE PLATE REINFORCED MEMBER  
NOABSTRACT

*JP 59-191998*  
*SHEET 1 OF 2*

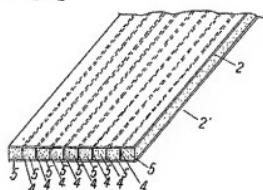
CASE# 10560,777

JP  
特開昭59-191998(3)

第 1 図



第 2 図



SHEET 2 OF 2

CASE # 10/560,777

DERWENT- 1982-22702E

ACC-NO:

DERWENT- 198404

WEEK:

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TITLE: Diaphragm for electroacoustic transducer having improved frequency characteristic, consists of mixt. of foamed resin and reinforced fibre such as carbon fibre, glass fibre etc.

PRIORITY-DATA: 1980JP-100857 (July 23, 1980)

PATENT-FAMILY:

PUB-NO            PUB-DATE            LANGUAGE

JP 57025793 A February 10, 1982 JA

JP 83058880 B December 27, 1983 JA



APPLICATION-DATA:

PUB-NO            APPL-DESCRIPTOR APPL-NO            APPL-DATE

JP 57025793A N/A            1980JP-100857 July 23, 1980.

Derwent Accession Number - NRAN (1):

1982-22702E

Title - TIX (1):

Diaphragm for electroacoustic transducer having improved frequency characteristic, consists of mixt. of foamed resin and reinforced fibre such as carbon fibre, glass fibre etc.

Standard Title Terms - TTX (1):

DIAPHRAGM ELECTROACOUSTIC TRANSDUCER IMPROVE FREQUENCY CHARACTERISTIC CONSIST MIXTURE FOAM RESIN REINFORCED FIBRE CARBON GLASS

CASE # 101560,777

US-PAT-NO: 2934612

DOCUMENT-IDENTIFIER: US 2934612 A 

TITLE: Electrostatic speaker

OCR Scanned Text - LPAR (5):

2,934,612 5 the fixed plate it is approaching causes an increase In its attraction to that plate. A correspondingly - increased separation from the other plates weakens the effect upon it of that plate. The resultant of these changes in the electrostatic forces incident to displacement of the dia- 5 phragm is to augment the effect of the potential differences which create the driving force. While the invention is here described and claimed in terms of a speaker, it is also useful as a microphone or other transducer to translate sound waves into an electrical wave. I include this within the scope of the claims. Thus, among others, the several objects of the invention as specifically aforementioned, are achieved. Obviously, numerous changes in construction and re-arrangement of parts might be resorted to without departing from the 15 spirit of the invention as defined by the claims. I claim: 1. An electrostatic speaker comprising in combination a frame, a relatively fixed plate which is capable of being charged electrically mounted on said frame, an acoustic 20 element also capable of being electrically charged, granules of material having the characteristics of foam rubber secured to a side of said plate forming individual resilient supports supporting the acoustic element substantially uniformly over its area to hold it away from the sur- 25 face of the plate and terminal means whereby an electro- static force can be established between said plate and said acoustic element. 2. An electrostatic speaker in accordance with claim 1, in which the acoustic element is a diaphragm of light, 30 thin, flexible film with high strength to mass ratio. 3. An electrostatic speaker in accordance with claim 1, in which the fixed plate is an acoustically transparent member of electrically conductive material. 35 4. An electrostatic speaker in accordance with claim 1, in which the fixed plate is composed of woven electrically conductive wires. 5. An electrostatic speaker having two fixed acoustically 6 transparent members and a diaphragm arranged between and parallel to the members, all capable of being electrically charged characterized in that the surfaces of both members are provided with granules of material having the characteristics of foam rubber extending towards the diaphragm and forming individual resilient supports supporting the diaphragm substantially uniformly over its area to hold it away from the surfaces 6f the members. 6. An electrostatic transducer having two relatively fixed condenser plates, each comprising an acoustically transparent screen woven from electrically conductive wire, a diaphragm disposed between said plates, and granules of material having the characteristics of foam rubber secured to a side of each of said plates forming individual resilient supports supporting the diaphragm substantially uniformly over its area to hold it away from the surface of the plate. 7. An electrostatic transducer comprising in combination a relatively fixed woven electrically conductive wire screen, a second screen identical with said first screen, a diaphragm of light, thin, flexible film having a high strength to mass ratio disposed between said screens and granules of material having the characteristics of foam rubber secured to a side of said first screen and also secured to a side of said second screen, said granules forming individual resilient supports supporting the diaphragm substantially uniformly over its area to hold it away from the surfaces of said screens. References Cited in the file of this patent UNITED STATES PATENTS 11764,008 Crozier ----- June 17, 1930 1,777,170 Kyle ----- Sept. 30, 1930 2,686,847 Aamodt ----- Aug. 17, 1954 FOREIGN PATENTS 695,243 France ----- Sept. 29, 1930 994,075 France ----- Aug. 3, 1951

CASE # 101560,777

PAT-NO: JP357073594A  
DOCUMENT-IDENTIFIER: JP 57073594 A  
TITLE: PRODUCTION OF DIAPHRAGM FOR SPEAKER  
PUBN-DATE: May 8, 1982

INVENTOR-INFORMATION:

NAME COUNTRY  
SANO, TAKAHISA  
SAKAMOTO, SHIGERU  
SATO, SUSUMU  
ICHIKAWA, SHUICHI

JP 357073594

ASSIGNEE-INFORMATION:

NAME COUNTRY  
FOSTER DENKI KK N/A

APPL-NO: JP55148165  
APPL-DATE: October 24, 1980

INT-CL (IPC): H04R007/02 , H04R031/00

US-CL-CURRENT: 381/423 , 381/FOR.162

ABSTRACT:

PURPOSE: To improve the strength of a diaphragm for a speaker by using a foaming agent composed of porous foamed synthetic resin to fuse highly elastic fibers with other materials through the foaming agent and generating firm coupling.

CONSTITUTION: To fuse various fiber materials, thermal expansion microcapsules rapping low boiling point solvents with vinyl chloride type resin are mixed into the varias fiber materials and fixed on the fiber materials with macromolecular coagulant. After forming these foamed fiber materials like a diaphragm and drying the sheet, these thermal expansion mirocapsules are foamed at about 260°C. Thus, the various fiber materials such as highly elastic fibers 1, pulp 2 and synthetic fibers 3 are fused mutually through the foaming agent 4.

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DERWENT- 1985-072527

ACC-NO:

DERWENT- 198512

WEEK:

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TITLE: Loudspeaker diaphragm comprising carbon fibre -reinforced-polyethylene sheet thermally welded to foam core sheet (J5 29.8.81)

PRIORITY-DATA: 1980JP-011060 (January 31, 1980)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
JP 85007439 B	February 25, 1985 JA	
JP 56109097 A	August 29, 1981 JA	

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP 85007439B N/A		1980JP-011060	January 31, 1980
JP 56109097A N/A		1980JP-011060	January 31, 1980

INT-CL-

CURRENT:

TYPE	IPC	DATE
CIPP	B32 B 5/18	20060101
CIPS	H04 R 31/00	20060101
CIPS	H04 R 7/02	20060101
CIPS	H04 R 7/10	20060101

Derwent Accession Number - NRAN (1):

1985-072527

Title - TIX (1):

Loudspeaker diaphragm comprising carbon fibre -reinforced-polyethylene sheet thermally welded to foam core sheet (J5 29.8.81)

Standard Title Terms - TTX (1):

LOUDSPEAKER DIAPHRAGM COMPRIZE CARBON FIBRE REINFORCED POLYETHYLENE SHEET  
THERMAL WELD FOAM CORE

DERWENT- 1983-797610

ACC-NO:

DERWENT- 198343

WEEK:

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TITLE: Diaphragm for speaker has UV curing resin layer with reinforced member provided on both surfaces of foamed sheet of thermoplastic resin.  
NoAbstract Dwg 0/3

PRIORITY-DATA: 1982JP-037729 (March 9, 1982)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
JP 58154996 A	September 14, 1983 JA	

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP 58154996 A/N/A			1982JP-037729 March 9, 1982

INT-CL-

CURRENT:

TYPE	IPC	DATE
CIPP	H04 R	7/02 20060101
CIPS	H04 R	7/12 20060101
CIPS	H04 R	7/18 20060101

Derwent Accession Number - NRAN (1):

1983-797610

Title - TIX (1):

Diaphragm for speaker has UV curing resin layer with reinforced member provided on both surfaces of foamed sheet of thermoplastic resin. NoAbstract Dwg 0/3

Standard Title Terms - TTX (1):

DIAPHRAGM SPEAKER ULTRAVIOLET CURE RESIN LAYER REINFORCED MEMBER SURFACE FOAM SHEET THERMOPLASTIC NOABSTRACT

PAT-NO: JP02007221417A  
DOCUMENT-IDENTIFIER: JP 2007221417 A  
TITLE: LOUDSPEAKER DIAPHRAGM

CASE# 10/560,777

PUBN-DATE: August 30, 2007

INVENTOR-INFORMATION:

NAME	COUNTRY
YAMANAKA, SHINICHI	N/A
INABA, ATSUSHI	N/A
TAKEWA, HIROYUKI	N/A
AKIYAMA, AKIHIRO	N/A
FUKUSHIMA, SHOZO	N/A

ASSIGNEE-INFORMATION:

NAME	COUNTRY
MATSUSHITA ELECTRIC IND CO LTD	N/A

APPL-NO: JP2006039006

APPL-DATE: February 16, 2006

INT-CL-	
ISSUED:	
TYPE	IPC DATE IPC-OLD

IPC	H04R9/00 20060101 H04R009/00
IPFC	H04R7/04 20060101 H04R007/04

ABSTRACT:

PROBLEM TO BE SOLVED: To provide a loudspeaker diaphragm capable of constituting a thin loudspeaker in which a high limit frequency is expanded as to a speaker diaphragm for a thin loudspeaker to be used for various image/acoustic apparatuses.

SOLUTION: The loudspeaker diaphragm is constituted of an approximately plane diaphragm 501, a spiral planar voice coil 504 formed at least on one surface of the diaphragm 501 and a reinforcing wire 121, formed on the inner periphery of the planar voice coil 504 separately from the voice coil 504. Since the reinforcing wire 121 also is formed on the plane diaphragm 501, in addition to the voice coil 504, the loudspeaker diaphragm can contribute to the thinning of a speaker as a loudspeaker diaphragm of superior shape rigidity.

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8/3K/3 (Item 3 from file: 348) [Links](#)

## EUROPEAN PATENTS

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00712878

**A loudspeaker and a method for producing the same**

Lautsprecher und Verfahren zu seiner Herstellung

Haut-parleur et procede de sa fabrication

## Patent Assignee:

- MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.;** (216880)  
1006, Ohaza Kadoma; Kadoma-shi, Osaka 571-8501; (JP)  
(Applicant designated States: all)

## Inventor:

- Okazaki, Masatoshi**  
7-22-404, Asahigaoka-cho; Ashiya-shi, Hyogo-ken; (JP)
- Mizone, Shinya**  
1488-107, Kozubeta, Isshindien; Tsu-shi, Mie-ken; (JP)
- Shimizu, Toshihiro**  
3-1, Sakuramachi; Matsusaka-shi, Mie-ken; (JP)

## Legal Representative:

**Kugele, Bernhard et al (51545)**

Novagraaf SA 25, Avenue du Pailly; 1220 Les Avanchets - Geneva; (CH)

	Country	Number	Kind	Date	
Patent	EP	675667	A2	19951004	(Basic)
	EP	675667	A3	20030219	
Application	EP	95104716		19950330	
Priorities	JP	9462669		19940331	
	JP	9475829		19940414	

## Specification: ...OF THE INVENTION 1. Field of the Invention:

## 2. Description of the Related Art:

Figure 1 is a half cross-sectional view showing a configuration for a typical loud speaker 20. Figure 2 is an exploded perspective view showing details of the loud speaker 20. The same constituent elements are indicated by the same reference numerals in Figures 1 and 2.

As shown in Figures 1 and 2, the loud speaker 20 includes a lower plate 3 integral with a center pole 2, a magnet ring... ...as the elasticity modulus E increases and as the density ( $\rho$ ) decreases. Such a loud speaker is capable of reproducing sounds in a higher frequency range and therefore realizing a broader reproduction range.

Moreover, the diaphragm... ...of the above, a principal material used for the diaphragm 8 of the conventional loud speaker 20 is paper which is composed mainly of natural pulp such as wood pulp. This... ...is required to withstand a large input signal applied thereto. In order for a loud speaker to have good resistance for such a large input, the voice coil 9 is required... ...a metal foil, e.g., aluminum, bent into a cylindrical shape. Kraft paper 14 is wound, for reinforcement and insulation, around an outer periphery of the voice coil 9 where a coil 15 is not wound. The bobbin 13 is obtained by winding the voice coil 9 on a portion of the bobbin 13 where the kraft paper 14 is not... ...temperature.

Recently, there has been a trend for using metals such as aluminum or organic foams for the material of the diaphragm 8, instead of the above-mentioned paper. However, organic foams have low elasticity and cannot... ...large. Therefore, these substitute materials for paper are not optimum materials for diaphragms of loud speakers for use in acoustic apparatuses.

8/3K/5 (Item 2 from file: 349) [Links](#)

PCT FULLTEXT

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00903728

**ACOUSTIC LOUDSPEAKER****ENCEINTE ACOUSTIQUE****Patent Applicant/Patent Assignee:**

- **BABB LABORATORIES**; 6618 Briarhaven Drive, Dallas, TX 75240

US; US(Residence); US(Nationality)

Legal Representative:

- **HUBBARD Marc A(et al)(agent)**

Munsch Hardt Kopf &amp; Harr, P.C., 4000 Fountain Place, 1445 Ross Avenue, Dallas, TX 75202-2790; US;

	Country	Number	Kind	Date
Patent	WO	200237894	A2-A3	20020510
Application	WO	2001US45185		20011030
Priorities	US	2000244430		20001030
	US	2001288284		20010502

**ACOUSTIC LOUDSPEAKER****FIELD OF THE INVENTION**The invention relates, in general, to **acoustic loudspeakers**.**BACKGROUND OF THE INVENTION**

To provide the greatest listening pleasure, an **acoustic loudspeaker** must meet several basic requirements. First, a **loudspeaker** must accurately reproduce very low frequencies, such as bass notes below 40 Hz, which are felt more than heard by most listeners. Second, **loudspeakers** must accurately reproduce overtones of high frequencies. Third, a **loudspeaker** should have a relatively flat frequency and phase response over the full range of audible... ...e., from approximately 30 Hz to 20,000 Hz, in order to produce high-fidelity **sound**. Fourth, to provide a wide dynamic range, a **loudspeaker** must handle signals with power sufficient to reproduce low frequencies at loud volumes without distortion to the **sound** or damage to the speaker.

A conventional **acoustic transducer** has a relatively stiff or rigid diaphragm which reciprocates along a linear axis. For reproducing... ...it may be flat or convex. To vibrate the diaphragm, an electrical signal representing the **sound** wave to be reproduced flows through a coil mechanically connected to the diaphragm. The coil... ...a fixed magnetic field, causing the coil to reciprocate with changes in the current. The coil is formed from one or more lengths of wire wrapped around a support structure. Typically, the edges of the diaphragm are attached to a basket shaped frame using... ...a cylindrically shaped pole and a donut-shaped magnet assembly.

Therefore, to **sound** low notes with great volume a **speaker** must be capable of handling a lot of power, mechanical stresses from the strong electromagnetic... ...through a large diaphragm and its natural resonances. A smaller diaphragm could be used to **sound** bass notes, but a longer throw or stroke of the coil would be required to... ...made to accommodate the demands of high and low frequencies in a single, broad band **acoustic driver**, particularly in the area of reducing the mass of the moving parts of the... ...which aids in moving the coil long distances when using a longer throw coil to **sound** bass notes. A low friction bearing can also be added around the circumference of the top end of the post. Lightweight, stiff metal alloys have been used to form diaphragms. **Coil** forms (structures for supporting windings of coils) have been made from high **strength**, thermally resistant materials such as KAPTON®. To provide a low mass, compliant suspension for the **diaphragm**, a stamped synthetic foam having a very low density with good dampening and resonance characteristics is used.